Precision Launch Rocket System: A Proposal for the Future of the Field Artillery

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Since the advent of indirect fire on the battlefield, the U.S. Field Artillery (FA) has used cannon-based weapons systems as primary delivery platforms. The past several decades has witnessed an explosion of various technologies that lend themselves to improving field artillery weaponry, so it is now appropriate to examine current capabilities and needs for the future and to suggest how field artillery should change as the Army enters the 21st century.

Where We Stand

The Army's field artillery weapons are not unlike those used during World War II. The M119 105-millimeter (mm) howitzer, the M198 155-mm howitzer, and the M109A6 Paladin 155-mm howitzer have characteristics remarkably similar to their forerunners. They use either semi-fixed or separate loading ammunition and are best suited for area fire. The towed M119's and M198's telescopic sight systems use fixed aiming references that were invented before World War II. The M109A6 Paladin uses state-of-the-art onboard position-locating devices and computers to aim the howitzer at its target, but its ammunition remains almost exclusively area fire. In sum, field artillery systems were built for an organization developed decades earlier.

While U.S. weapons have made modest technological advances since World War II, they are fast becoming antiquated. The Army has witnessed improvements in range, lethality, and accuracy, but this is not enough, given the furious pace of advance by other systems. Army systems, however, weigh more now than did similar World War II systems, but Army cannons are rapidly falling behind the capabilities of foreign-produced guns, such as Britain's AS-90, South Africa's G-5/6, and the North Korean *Koksan* gun. That the Army is falling behind should provide adequate incentive to press for a change that will place it head and shoulders above all other nations' armies in ground-based fire support.

Future Battlefields

In light of technological advances, the Army's FA arsenal is losing relevance at an increasing pace. Today's battlefield is far more lethal than the battlefields of either World War II or the Persian Gulf war because precision munitions are becoming the preeminent weapons of choice. In the Persian Gulf war, less than 9 percent of munitions the U.S. Air Force (USAF) used were precision weapons. Eight years later, in Kosovo, the figure had risen to 29 percent. During the war in Afghanistan, the number of munitions expended soared to an astounding 70 percent.[1] Precision munitions have allowed the USAF to greatly reduce the number of sorties and bombs required to adequately service a target. For example, in World War II, one thousand sorties of B-17s with nine thousand bombs were required to destroy one target. Today, the USAF can fly one B-2 sortie delivering 16 global positioning system (GPS) bombs to 16 targets. The circular-error probable for bombs from the 1940s was 3,300 feet compared to the current 20 feet.[2] The Army's field artillery must use a similar concept to gain this capability with an all-weather, ground-based fire support system.

The battlefield is likely to be far from the United States in a landlocked country. Because of limited USAF lift assets and the heavy weight of Army cannons, field artillery, except towed howitzers, has little strategic mobility. Therefore, it is imperative to develop a lighter weight precision-launch rocket system (PLRS) that lends itself to strategic airmobility.

The military is reducing the long logistical tail traditionally associated with operations. Rather than maintaining large stockpiles of ammunition and other logistic items, the military is reducing stockpiles and replenishing just-in-time service. Cannon-based systems using area fire munitions belie the just-in-time concept. The Army's mode of operation—massed fires from multiple guns—requires enormous stocks of ammunition and a heavy lift capability. Logisticians report that the need to haul artillery ammunition generates approximately 70 percent of a division's logistical requirements.[3] Through its capability to hit a target precisely rather than by throwing multiple volleys of area fire munitions from many guns, PLRS can drastically reduce the amount of munitions a division requires.

Future battlefields will require ground units to cover ever-widening frontages. In World War II, an infantry division covered about 9 kilometers (km) of front; in Korea the distance had expanded to 15 kilometers; and by the time of the Persian Gulf war, the frontage had doubled to 30 kilometers. In the future the Stryker Brigade Combat Team might have to operate across an astonishing 50 kilometers. The Army has no cannon systems that can provide ground fire support in the close fight across a 50-km front and also provide fires for the deep fight.

Modern cannon systems' modest range fans have improved greatly, but rapidly changing battlefields demand additional improvement. Technology is available to design a rocket system that can deliver precision munitions to targets over 50 to 75 kilometers away. Developing such platforms would ensure fire support could cover the zone in the close fight and in a deep fight place the enemy's rear areas under fire as well.

The Army must develop a simple way to link new systems digitally to sensors. A precision system would demand an easy method to link forward observers (FO) or sensors, such as unmanned aerial vehicles (UAV) or radar, to individual weapons to attain responsive fires. For example, a UAV might have an onboard data link to a

firing unit. When the UAV discovers the enemy's location, for example, a second-echelon assembly area, the operator transmits the data digitally to the firing unit. The unit receives the data and automatically sets the target location on the rocket loaded in the launcher. Within seconds of the command to fire, the ordnance, guided by a GPS seeker, is on its way downrange—similar to the USAF's retrofitted dumb bombs. Such a system will enhance responsiveness for the observer-sensor while improving the ability of a commander to reach deep targets.

How the System Might Look

The system I propose is not unlike the multiple-launch rocket system (MLRS), the high-mobility artillery rocket system (HIMARS), or the promising rocket-in-a-box system. The element representing a step forward from these systems is precision guidance of some type. Precision guidance will enable rocket systems to perform close support as well as to conduct deep strikes throughout the depth of the enemy zone of operations.

I recommend lightening the current MLRS to make it air-transportable by reducing the number of pods from 12 to 6 and compressing the chassis. Since HIMARS can already move via air transport, little conversion would be required to ready this system for precision rockets. The rocket-in-a-box seems an excellent fit for the future land component of the Objective Force with its light weight, range, accuracy, and tactical and strategic mobility.[4]

Such platforms would provide fire support to light, medium, or heavy units in a tracked or wheeled configuration. The system should have a variety of munitions from which to choose for multiple situations; smoke; family of scatterable mines; improved conventional munitions; bunker-busting high-explosive munitions; and illumination. Regardless of its munition, it should be guided to its target for precision attack. I suggest GPS munitions that are resistant to electronic warfare. In recent years, the USAF has retrofitted dumb bombs with GPS kits called joint direct attack munitions for precision guidance to targets. Pilots or ground crews set off the target data on the munitions when in flight or loading.

The field artillery could develop GPS munitions that could work in a similar fashion. The FO or sensor would send a call for fire digitally (possibly on a handheld computer) to either a battalion fire direction center (FDC) or to a pre-designated weapon. The FDC performs tactical fire direction to determine whether to mass multiple systems or to use individual launchers. Once received at the weapon, the crew would review the request and digitally set the target data from the crew compartment to the GPS munition already uploaded in the launch pod. When commanded to fire, they would trigger the launch, which would guide itself to the requested location.

One special munition is called a bunker buster. Some might argue that the Army needs cannons for their power to penetrate hard targets because the Army's 155-mm howitzers do not have that capability. There remains a great need for the capability to penetrate bunkers and other hardened sites, as the war in Afghanistan has demonstrated. However, this does not mean a cannon must perform this task. Several technologies are currently available that would enable a rocket (such as the laser-guided hard-target-penetrating bomb, the GBU-24) to perform this mission. During the Persian Gulf war, the USAF developed a bunker-busting guided bomb that uses condemned 8-inch howitzer tubes. The USAF guides the bomb to its target. Once the bomb penetrates to the prescribed depth, preferably in an enemy complex, the secondary munitions detonate and destroy the bunker. The well-known baby milk factory incident in Iraq is an example of the use of such munitions. Therefore, it should be possible to develop a similar precision munition for rocket artillery.

Potential Benefits of PLRS

A host of potential benefits, including enhanced strategic mobility, can be associated with the development of a new rocket-based system. The greatest drawback to maintaining a cannon-centric field artillery is that the howitzers' weight reduces air transportability. The reduced weight of a rocket system would enable the field artillery to move to distant theaters by air to add all-weather firepower to the combined arms team. Other potential benefits include the following:

- The ability to attack distant targets with precision. The joint targeting team continues to prefer precision-strike weapons systems as the most effective means of attacking enemy targets. A more accurate FA platform with the power of rocket munitions would add an excellent capability and new choice to the arsenal of the joint targeting team. A precision rocket system can provide close support as well as deep fires for all-around fire support.
- The ability to reduce the long logistical tail. The ability to attack with a precision FA rocket system would greatly reduce the transportation requirements for munitions. This would also support just-in-time logistics by reducing the need for large stockpiles of munitions. Overall, precision rocket munitions would offer cost savings in transportation and numbers of rounds required.
- The capability to provide force protection. The MLRS and the Army's current Paladin are highly mobile, thus lessening the threat from enemy counterfire. Nevertheless, these systems must sometimes fire multiple volleys for one fire mission from the same firing position to achieve the prescribed effects on the target. A precision system can potentially reduce the number of volleys fired to achieve required effects because it can place the round at a more precise location. Weapon systems that fire GPS munitions are nearly impossible to detect with weapon-locating radar because the munitions do not follow a ballistic trajectory. Not being able to detect the weapon systems' location lowers the risk from counterfire because the firing platform does not have to remain in position as long, thus saving many lives and much costly equipment.
- The ability to conduct precision field artillery attacks. Precision attack reduces the number of delivery platforms and the personnel required to man them. Currently, cannon battalions have 18 guns and 6- to 13-man

crews in their TOE. This provides the unit the ability to mass all of the guns in area fire missions. Often, the guns must fire multiple volleys to achieve the desired effects. A precision attack system would not only reduce the number of volleys, it would also reduce the number of platforms needed to attack a target. PLRS is not an area-fire concept but a precision-weapon concept. Therefore, the idea is to make the field artillery a one-round, one-kill combat arm.

Implications

Has the field artillery lost its relevance as it moves into the 21st century? While I would answer this question with an emphatic "No," I must agree that the branch is slipping behind at a steady pace. The most important thing the field artillery can do to maintain its place in combined arms operations is to adapt a weapons system to the changes in future military thinking and technology. Trends suggest that there is a need for a strategically mobile, precision-capable weapons system that requires a greatly reduced logistical tail.

Now is the time to shift from cannon-centric systems to a precision-launch rocket system with a suite of munitions available for the full range of combat operations. Munitions should have a reliable, cost-effective guidance package such as an electronic-warfare-resistant GPS system. Precision rockets can maintain and enhance current capabilities; provide air-transportable fire support; offer the joint targeting team an additional weapon for precision attack; and greatly reduce the logistical tail of artillery units. Developing such a system will take time, but the military has the technological means to meet such a challenge. Fielding a new precision-rocket platform will keep the field artillery on the forefront of combined arms operations. ***MR***

NOTES

1. William M. Arkin, "Smart Bombs, Dumb Targeting?" *Bulletin of the Atomic Scientists* (May-June 2000): 47; Brigadier General David A. Deptula, "Effect-Based Operations: Change in the Nature of Warfare," *Aerospace Education Foundation Defense and Airpower Series* (2000): 8-16; *The Associated Press*, "U.S. Bombing in Afghanistan Said to be Most Precise Ever," *The Kansas City Star*, 10 April 2002, A17.
2. Deptula, 8.
3. U.S. Army Command and General Staff College (CGSC) Student Text 101-6, *Combat Service Support Battle Book* (Fort Leavenworth, KS: CGSC, 2001), 4-10, 4-11.
4. George A. Durham and James E. Cunningham, "NetFires: Precision Effects for the Objective Force," *Field Artillery Journal* (March-April 2002): 5-9.

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